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AMERICAN JOURNAL OF OPTOMETRY

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A THEORY AND NON-SURGICAL TREATMENT OF GLAUCOMA FOR OPTOMETRISTS*

J. O. Baxter, Sr., Opt.D.
New Bern, N. C.

Normal intraocular pressure is maintained by the inflow and outflow of fluids from within the eye being equal. As long as this poise is maintained, there can be no abnormal change of ocular pressure. In the event that this state of equilibrium is disturbed, then there is necessarily an increase or decrease of pressure, depending upon whether the inflow or outflow is disturbed. In the event of the former, the pressure is decreased, in the latter case it is increased.

It is generally conceded that glaucoma is a disease in which a long trail of morbidity results in the interference of the outflow of fluids from the eye. Without this inhibition there could be no glaucoma.

I wish to state here that it is not the purpose of this paper to discuss the usual etiology of glaucoma, but to call attention to what I believe to be a prime cause of the disease in all of its ramifications, and one that has received very little if any attention so far as I know, and, what is of more value, a treatment that has worked with immediate and apparently permanent results in many cases. Of further interest to those of our profession who wish to go into this phase of the work is suggested a treatment that appears vastly superior to any medical or surgical treatment hitherto generally used.

It is known that the most important channel for the outflow of the intraocular fluids is through the Pectinate ligament to the canal of Schlemm, thence to the anterior ciliary veins. "Through this system by far the greatest part of lymph leaves the eye."[1] It is with this division of the ocular system and its common degenerative changes that may result in its obstruction that the writer wishes to submit a theory as to the causation of glaucoma.

Glaucoma generally develops at the time of life that arterio-sclerosis appears, the latter disease being largely characterized by obstructive fatty deposits which tend to close the intima of the blood vessels. Sclerosis of an artery, unless the veins are involved, could not interfere with the

*Submitted for publication August 20, 1935.

venous exit of lymph from the eye; it could only block the inflow. Glaucoma is produced by a disturbance of the outflow of fluids from the eye. "This fluid is an exudate of the ciliary body, which chiefly produces it."[2]

The reverse of the above would happen should the veins be attacked first, or in a more advanced stage than the arteries, in which case the outflow would be obstructed.

Let us consider the pathological distribution of fat, which abnormal distribution may result in glaucoma. It is not possible to name the many diseases in this paper which result in the abnormal deposits of fat; it is stored in the heart, the liver, the kidneys, the blood and blood vessels, the orbit and in the eyes from such diseases as obesity, diabetes, kidney disease, anemia, nerve degeneration, arterio-sclerosis, et cetera.

It will be seen that there are many causes for the pathological distribution of fat. Cells may be injured in various diseases and toxic damage result in cases of infection; in such cases the cells are unable to consume their fat with normal rapidity, fat thus accumulating because it has not been properly oxidized. In known defects of the hypothysis and thyroid in young persons, great obesity often arises.[3] The orbit is a selected site for the deposit of fat, this arising from the digestive tract and being conveyed through the blood stream. Oil globules and droplets of fat which are set free from adipose tissue, as well as thrombi, fragments of thrombi, tumor cells, bacteria and gas bubbles are all found in the blood stream and are capable of forming an embolus in almost any part of the vascular system as well as in the eye. Not only may there be a direct mechanical blocking of the vessels draining the eye from the above causes; other disturbances may arise through the nervous system that may actually contract the vessel walls, this making it difficult to draw a line between the physiological constriction of vessels and the blockage that arises from disease. Vessels thus narrowed are very often finally and completely closed by the formation of a thrombus throughout the narrowed part.[4] Emotional disturbances such as worry, anger or fright, or any other causes that affect the sympathetic nervous system are apt to usher in a glaucomatous attack, inasmuch as this system stimulates vasomotor contraction—provided, however, the contraction is more marked in the veins than in the arteries.

With the exception of arterio-sclerosis and resultant venous congestion, the above train of morbidity has remote possibilities for the causation of glaucoma. In that all of them do occur, and in the event that any of them happen to involve the excretory venous system of the eye, there is no result other than a block of that part or parts of the system involved. Should there be a partial block, we may then have a simple or chronic congestive type; if the block is nearly complete, then the acute type of glaucoma will result.

In general physiology the well being of the tissues is dependent upon the continuous and unobstructed circulation of the blood through

them from the arteries and veins. In the distribution of the fluids of the blood into the tissues, and in the drainage of these tissues, no matter how rapid the circulation may be, there is at no time an excessive quantity of fluid among the cells. There are conditions, however, in which a disproportion in the rate of inflow and outflow occurs, there then arising an accumulation in the crevices of the tissues (oedema) or in the body cavities. The accumulation of these fluids may be general or localized.[5] The cause may be a general disturbance of the circulation, and it is very often due to chemical changes in the tissue or blood itself, or heart or kidney disease, and upsets of trophic and vasomotor nerves, et cetera. Any of these factors may result in a local stagnation of venous blood which will obstruct the outflow of fluids while the inflow continues. The result is a constant increase of fluids into the issues or organ involved.

Stagnation of the fluids of the eye brought about by local or general venous stagnation in which arterial inflow is unimpaired can but result in an accumulation of fluids within the eye and an increase of intraocular pressure.

This theory may perhaps explain the frequent association of glaucoma with some of the above named diseases. It also suggests the prime importance of full cooperation with an intelligent general physician.

Fatty infiltration of the eyeball is, to a more or less marked degree, common in all old people, and is especially prominent in diabetics and those with arterio-sclerosis. Lipoid deposits near the exterior margin of the cornea (arcus senilus) are indicative of other degenerative ocular changes; very striking deposits are seen throughout the sclera, Bowman's, Decemet's and Bruck's membranes, and in the extremities of the ciliary body.[7] A vessel wall affected with the fatty degeneration of arterio-sclerosis is easily torn with frequent consequent hemorrhages due to such degeneration.[8]

Widespread vascular disease is present in glaucomatous eyes, for hemorrhages are common both in the retina and in the uveal tract. In hemorrhagic glaucoma thrombosis of one of the central veins is *always* found.[9] The thromboplastic substances of a blood clot are *lipoids*.[10]

The sclera in glaucoma is increased in density and is infiltrated with fat, appearing as though it were sprinkled with drops of oil.[11] This hardening of the sclera around the slender efferent veins which pierce it, together with the fat-choked veins and sclera *must* have a tendency to interfere with the outflow of fluids from the eye.

Of significant etiological importance is what might happen should the channel of the outflow of fluids from the eye be obstructed by the degenerative fats of arterio-sclerosis. In other organs than the eye, sclerosis of the small veins of the order of those in the retina is extremely rare. In the retina, venous sclerosis is quite common.[12] In glaucoma, sclerosis of the pectinate ligament and of the retinal vessels is frequently seen.

No age is exempt from arterio-sclerosis; it is rare, however, in infancy, while in senility it is ever present.[13] The earliest recognizable changes marking the beginning of arterio-sclerosis are found in the form of very slightly elevated, flattened streaks of fat; with further advance of the disease, these yellow patches are found to be profusely distributed among the older lesions. Sections passing through them show that while the arteries are normal elsewhere, the elevation is due to a distinct thickening of the intima produced by a new formation of connective tissue with small and large wandering cells. Both the branched connective tissue cells are found to be *loaded with fat*. In the latter stage, the hillock of thickened intima becomes more extensive and thickened, and the tissue becomes hyaline or necrotic about the most *abundant accumulation of fat*. Dense connective tissue forms over this mass of fat. When the vessel is opened, the most common and characteristic appearance of arterio-sclerosis is found in the elevated, rounded, or irregular patches or plaques, which stand up from the intimal surface of the vessel like *solidified drops of paraffine*. These may occur anywhere; they seem hard and homogeneous but on cutting through them there is always found the mass of opaque, yellow fatty material hidden in their depths. From the edge, this yellow mass can be expressed, or dug out and its soft mushy character is the origin of the name of atheroma. This same mass often becomes very soft so that if its inner wall or roof of tissue of the sack gives way, the contents are washed out into the blood stream, with thrombosis a likely eventuality.

Further degenerative changes occur in this soft fatty mass, which undergoes chemical changes which convert it into a stony, calcerous plaque.[14]

Degenerative sclerotic changes in the arteries are always accompanied by analagous changes in the veins, and the process may be further advanced in one than in the other.[15]

Tissues in which sclerotic arteries are distributed undergo fibrous and hyaline degeneration coincident to the degenerative changes in the arteries.[16] Obviously, means other than surgery are necessary to remove fat impregnated tissue from occluded effervent vessels of the eye.

THE EFFECT OF LIGHT AND HEAT UPON THE TISSUES

"The storing up of fat can be prevented, and the fat made to disappear by active exercise, massage, or even by hot baths, which seem to hasten its consumption."[17]

"About 25% of (the) heat rays pass through the cornea and sclera and reach the aqueous and superficial parts of the vitreous."[18] Heat causes the *immediate* development of an arterial hyperemia, thus bringing more arterial blood to the part and sending more venous blood and lymph out of the part; it accelerates phagocytosis, absorbs inflammatory exudates, relieves pressure, *and will prevent the development of fibrosis, weakening, softening, or breaking up any fibrosis which may have already formed*, also dilating the capillaries and relieving venous congestion.[19]

MacCallum states that "ordinarily we meet with conditions in which the tissues are acted upon by a whole series of different forms of radient energy at once," and that but little effect is produced by the (visible) red rays as compared with the ultra-violet. The red rays are capable of producing an influence only in the presence of oxygen. The ultra-violet rays have an intense effect upon the tissues, in which they seem to act as a catalytic agent, apparently through producing intense chemical decomposition and oxydation. Their relation to lipoid substances is peculiar, in that the rays sensitize them and prepare them for oxidation or fermentative decomposition. An intracellular oxidation is brought about without the advent of extra oxidation, through the facilation of decomposition of the lipoid substances *by the action of light*. (Italics mine.) For this, the red rays require an actual excess of oxygen. Ferments are affected also, perhaps secondarily, by the altered lipoids, which, themselves under the influence of light, acquire a photoactivity."[20]

Incontestable as the evidence appears as to the decomposition of fatty tissue by heat or light, with all its complications of chemical reaction and decomposition by fermentation, oxidation, hydrolysis, phagocytosis, necrosis, et cetera, this evidence does not suggest the simple, well-known fact that heat melts fat, and by this method clears the tissues and veins of the eye of fatty degenerative material that blocks the exits of intraocular fluids. Pathologists will see the possibilities of similar treatment of fatty obstructions elsewhere in the organism.

Working upon this hypothesis, the following case reports are presented:

Case 1. Mrs. M. presented the regular symptoms of a chronic congestive type of glaucoma, presenting a bilateral Seidel scotoma, cupped disc, dilated pupils, pain, transient blurring of vision, (V.A. 20/30), pericorneal injection and increased tension. This patient was, within three days, permanently relieved of pain, and vision restored to normal by the use of a carbon filament (infra-red) heat lamp. The scotomata remained the same.

F. Parks Lewis of Buffalo reports several permanent arrests of old, practically useless and painful glaucomatous eyes, with spectacular improvement in vision by the use of a carbon filament heat lamp preceded by the local use of an alkaline glycerine solution.[21] The reports follow:

Case 1. Eyeball stony hard, cornea steamy, the outlines of the pupil could not be seen, intolerable pain with light perception lost. Treatment was instigated with the heat lamp for one hour daily periods in conjection with the alkaline solution mentioned, heat at about 125° F. After a few weeks the cornea became clear, redness disappeared, tension became normal, visual fields became normal with five foot finger vision through a cataract lens. The eye resumed its normal appearance, and remained wholly free from pain and irritation.

Case 2. Eye exceedingly painful, tension 90 (McLean). Attack began with nausea and vomiting. Eye ground could not be seen and

media obscured. Heat was applied with the former solution for thirty minute daily periods. After eight weeks the eye was entirely comfortable.

He felt that the results in these cases justified him in using the treatment in acute cases for the preservation of vision, other cases following.

Case 3. October 2nd. Right eye painful and irritated for about a week. Tension 90 (McLean), cornea steamy, vision (O D) 20/70, (O S) 20/30. Heat treatment with glycerine, pilocarpine and dionin locally was given, resulting in intolerable pain during the night, the eye being much worse the following day. This treatment was followed by exposure to the heat lamp with marked relief, all symptoms being improved on October 3rd. The pain was almost gone on the 4th. On November 12th the eye was entirely comfortable, with vision 20/20 with difficulty. The heat was used almost daily for from 45 to 50 minutes.

Case 4. Patient was suffering from intense pain and redness of acute glaucoma. Light perception was absent and no hope to be expected from surgical measures for visual improvement. Milk was given intramuscularly as a foreign protein; heat was used for one-half hour periods every other hour, and epinephrine and glycerine one drop every hour. The pain disappeared in less than 24 hours and did not return. The eye remained blind, but comfortable.

Case 5. O D found with marked increase of tension cornea cloudy, and highly injected, painful eyeball. There was a corneal abscess about two m/m in diameter. This was perfectly white, and penetrated into the deeper layers of the cornea, with danger of perforation. The treatment of heat and alkalines was followed by an immediate sense of relief. The general congestion was quickly reduced, and on the eighth day nutrient vessels were seen running to the small remaining corneal opacity, which seemed to melt away under the heat. Tension was normal and the cornea clear.

We would hardly expect the above results from the use of the drugs mentioned, or any other drugs, without the heat treatment as described. Certainly any relief obtained from drugs placed in the conjunctival sac would be transient, but we might ask, however, if such results could be hoped for from any surgical measures.

There seems little doubt that these cases, ranging in age from 51 to 71 years, are subject to the usual sclerotic changes that perhaps block the efferent pathway of fluids with debris and fatty degenerative material, and that the heat simply liquefied the fat and thus facilitated its easy passage through the heat dilated vessels, sweeping with it other obstructive debris, leaving a permanent channel for the outflow of fluids from the eye.

We have seen the prompt and apparently permanent relief of glaucoma in the several cases cited, resulting from the use of heat, and there is little doubt that there is a simple and logical explanation of this.

We may possibly arrive at the explanation by a process of elimination. First, we could hardly conclude that the only action of heat would be to change the spatial relations of the crystalline, ciliary body and iris to each other and draw them away from the filtration angle. Second, heat could hardly lessen the inflow of fluids into the eye, the opposite action being more probably due to the known facts of the action of heat upon secretory activity and upon vascular (arterial) dilation. Third, it seems improbable that heat alone would break up any kind of synechia that occluded the outflow of fluids from the eye. Fourth, inasmuch as heat acting upon the eyes only reaches the anterior parts of the vitreous, it could have no influence upon the posterior drainage of the eye, this part of the drainage system of the eye, moreover, being of rather slight importance anyway. Fifth, it seems illogical to suppose that heat could dissolve insoluable debris, inflammatory exudates, albuminous aqueous or other matter in the channels of outflow, if these channels were closed. It therefore seems that *heat must open up these channels*, and the question narrows down to the problem of what is most likely to close them.

From what has been said, it would appear that the common degenerative end-products of arterio-sclerosis are an important factor in the closing of the efferent channels of the eye, and we can readily see that heat may, in the most simple manner, melt the fatty obstructions that exist in this disease, and it may break down or prevent fibrosis of the pectinate ligament, clearing it and the cornea, sclera, and anterior venous system of excessive fluids and debris, these being under an increased pressure, and being subject to an increased arterial secretion of lymph, fatty deposits, and accrued debris.

In general pathology of the vascular system it is not uncommon for nature to establish a collateral circulation to replace damaged vessels,[22] or to re-canalize old ones in thrombotic conditions.[23] The vessels of the eye should be no exception to the rule. The dilating effect of heat upon the blood vessels may possibly favor the establishment of a collateral system and thus restore the efficient lymphatic circulation of the eye.

It is not remarkable that fatty materials, in their routes through the blood stream and its infiltration through the blood vessels to the tissues, should accumulate, saturate and adhere to the vessel walls throughout the years, making it increasingly difficult for the passage of the nutrient fluids, this resulting in the trophic degeneration and sclerotic changes in the tissues involved, but, also, due to the saturation of the arteries with fatty debris, they are less able to receive their blood supply from the vessels supplying the arteries and undergo the same degenerative changes as the tissues which they supply. The implication is that arteriosclerosis is a result and not a cause of fatty degeneration.

It is significant and worthy of thought that at the time of life that the internal glands and their secretions are on the wane, that glaucoma usually appears. We therefore present the idea for further study on the simulation on the thyroid, pituitary, pancreas and bile, also the hydro-

losis of fats for the splitting up and decomposition of obstructive fatty degeneration of the efferent drainage system of the eye.

SUMMARY

Most common in latter years is the almost ever present degenerative changes in the vascular system that leads to its occlusion by the fatty deposits and debris of arterio-sclerosis.

The same degenerative changes existing in the vascular system are present in the tissues which they supply, including the pectinate ligament.

In the event that fatty degeneration is only in the veins, or more advanced in the veins than in the arteries, then necessarily the lumen of the efferent system is closed to a degree, depending upon the thickness of the obstruction, this perhaps explaining the varying severities of glaucoma.

Inasmuch as heat or radiant energy aids in and causes the decomposition of fibrous and fatty tissue as well as the liquefaction of fats, we should expect the same results in the fat-choked, anterior efferent drainage system of the eye, and when this matrial reaches its melting point by the application of heat, it is then, along with other debris, washed out into the blood stream with the permanent relief of glaucoma.

CONCLUSIONS

The exact wave length or lengths of the carbon-filament lamp that affect the arrest and relief in the cases cited are not known, neither is the total transmission spectrum of the lamp known. We must therefore assume, until contradictory evidence is presented, that infra-red rays predominate and are responsible for the reported results. Other visible or invisible rays may have physical or therapeutic value, and as an aid in this work the manufacturers should furnish such information as is required.

DR. J. O. BAXTER, SR.
NEW BERN, N. C.

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ABNORMAL PSYCHOLOGY AND ITS CLINICAL APPLICATION*

J. I. Kurtz, B.S., A.O., F.A.A.O.
Minneapolis, Minn.

Introduction

While the studies of abnormal psychology date back only to the nineteenth century, the application of psychotherapy has a long, varied and interesting history. The knowledge[1] of hypnotism and its therapeutic value dates back to the days of ancient Egypt, Greece, Rome, Persia, India and China. The "laying on of hands" was practiced as far back as 1552 B. C., and a similar mode of treatment was employed by priests of Clades in ministering to the sick. There are many other instances recorded which testify to a remarkable extent to which psychotherapy in one form or another was utilized in the countries of the ancient world. This was carried on merely on the basis of "faith cure" with no attempt at diagnosis. Even during the middle ages, there was no real understanding of the psychological or physiological principles governing the operation of this therapy.

During the latter part of the eighteenth century, Mesmerism held the attention of the European countries. Mesmer talked of forces such as electricity, magnetism and nervous force of which very little was understood at that time. He claimed[2] that, "Planetary influence exerted itself on the human body by means of a universal fluid in which all bodies are immersed." This marked the beginning of the animal magnetism period. There are others who expounded this principle and carried on this work much further than Mesmer. Then during the early part of the nineteenth century, Puyseguer discovered accidentally the state of somnambulism (a condition in which the patient while put to sleep under the influence of magnetism, will move about, speak and perform, without effort, anything suggested to him, but will forget all about it after his awakening), while treating a patient with the method of magnetism.

During the latter part of the nineteenth century, Christian Science took a firm foothold in the United States. This comparatively new method was originally advanced by P. P. Quimby and was later on

*An abridgment of the material presented before the Minnesota Academy of Optometry at Minneapolis, Minn., Sept. 22, 1935.

amplified by the work of Quimby's secretary, Mrs. Eddy herself, a sufferer of a nervous illness of which she was cured by Quimby.

Other developments of the nineteenth century are: Hypnotic suggestion, metallotherapy, esthesiogenics and psychoanalysis. A number of educators and students became interested in this subject during the nineteenth century and they began to approach study and observe it from a scientific standpoint. A tremendous amount of literature had been written upon this subject with a view of explaining the phenomena underlying psychotherapy.

The Normal Person

It is important that we first get a clear picture and understanding of the normal individual so as to enable us to study the different types and deviations from the normal.

An individual possesses different functions psychologically, just the same as he is made up of different cells structurally. The functions or aspects of which the individual is made up may be classified according to Fischer[3] as follows:

1. Cognative,
2. Conative,
3. Affective.

Cognative includes such processes as perceiving, reasoning, remembering and imagining.

Conative includes the tendency, urge, drive, motivating force, impulse, desire, etc.

Affective includes anger, fear, sadness, happiness, love and hate.

The cognative aspect assumes the nature of mechanism; conative aspect, that of motivating force; the affective aspect appears to be a combination of the above two mentioned functions.

The normal individual is then made up of a number of functions known as *innate dispositions*. Fischer claims "that any innate disposition may be attached to almost any perceptible aspect of the environment, provided such aspect is perceived simultaneously with or immediately preceding a stimulus which is adequate for the arousal of the disposition." This attachment of disposition is known as *conditioning*.

Normal Psychological Types are classified as:

1. Introvert—one who is seclusive, a thinker, sensitive to remarks of others, laughs little, is a poor mixer.
2. Extrovert—he is just the opposite of an introvert, he is dynamic, on the go, a good mixer and talker. He is never embarrassed and gives free expression to his emotions and feelings.
3. Ambivert—he is a combination of the first two types.

Fischer gives the following interesting list of personality signs:

1. The introvert blushes easily, the extrovert rarely blushes.

2. The extrovert laughs more readily than the introvert.
3. The introvert is usually outspoken, the extrovert is usually careful not to hurt the feelings of others.
4. The extrovert is a fluent talker, the introvert can prepare a report in writing easier than he can tell it in conversation.
5. The extrovert loans money and possessions more readily than the introvert.
6. The extrovert moves more rapidly than the introvert in the routine actions of the day, such as walking, dressing, talking, etc.
7. The extrovert does not take particular care of his personal property, such as watches, clothes, etc., the introvert is found continually oiling, polishing, and tinkering.
8. Introverts are easily embarrassed by having to be in front of a crowd.
9. Introverts are usually reluctant about making friends with the opposite sex, while extroverts are attracted by them.
10. The extrovert is a more natural public speaker.
11. The introvert likes to argue.
12. The introvert is slow about making friends.
13. The introvert re-writes his letters, inserts interlineations, adds a postscript and corrects every mistake of a typist.

The list of "personality signs" which follows is revealed chiefly in the thinking and attitudes of the individual.

1. The introvert worries, the extrovert has scarcely a care in the world.
2. The feelings of the introvert are easily hurt, the extrovert is not bothered by what is said about him.
3. The introvert deliberates in great detail about everything, what to wear, where to eat, etc., and usually tells one why he decided to do what he did.
4. The introvert rebels when ordered to do a thing, the extrovert accepts orders as a matter of course.
5. The introvert is urged to his best efforts by praise, the extrovert is not affected by praise.
6. The introvert is suspicious of the motives of others.
7. The introvert is usually radical in religion and politics, the extrovert, if he entertains any opinions, is usually conservative.
8. The introvert would rather struggle alone to solve a problem than ask for help.
9. The introvert would rather work alone in a room than with others.
10. Extroverts follow athletics, introverts, books and "high brow" magazines.

11. The introvert is a poor loser.
12. The introvert day-dreams a great deal.
13. The introvert prefers fine delicate work (die-making, accounting), while the extrovert prefers work in which details do not matter.
14. The introvert is inclined to be moody at times.
15. The introvert is very conscientious.

Abnormal Types

Any deviation from the normal may be considered as abnormal. Of these we may find two different types: (a) minor mental abnormalities; (b) major mental abnormalities.

In the first type, we may find persons who are continually complaining about their various ills such as headaches, eye strain, blurred vision, dizziness, nausea, rheumatic pains or cramps, aches, extreme fatigue, insomnia, loss of appetite and nervousness. They are suffering from a condition of "anxiety neurosis" and are too anxious about their health. They may make their rounds from one doctor to the other and in most of these cases no organic abnormalities are to be found and when the doctor tells them that there is nothing wrong with them, they fear that he does not understand their case or else is disinterested and therefore go to another doctor and to their disappointment are told the very same thing. This, nevertheless, does not relieve them from their anxieties and phobias.

In the group of major abnormalities, we find individuals who are bordering on the line of insanity. Some of them may sit quiet in their chairs for days without moving about or talking to one and another. Others will go about shouting loud and will be fighting and attacking the other patients in the ward and they will therefore have to be segregated and kept under guard.

In studying cases of abnormal psychology, we find that authorities differ as to the probable cause as well as to the methods of approach. Hollingworth[4] gives the following important viewpoints of mental abnormality:

1. The neuroanatomical theory,
2. The physiological theory,
3. The psychological theory,
4. The psychoanalitical theory.

The Neuroanotomical Conception

From this point of view, the individual is considered as a machine which has the characteristics of motion, conductivity and sensitivity. Motion is considered dependent upon the muscles and motor nerve tracts. Sensitivity depends upon the peripheral sense organs, sensory nerves and sensory areas in the brain, while conductivity depends upon both sensory and motor nerve tracts. Behavior is a function of sensory motor,

and associative mechanisms, and it involves an elaborate architecture of a nervous system and structure. All disorders are explained from an anatomical standpoint as being caused by a "lession" an injury or structural defect or some mechanical interference at some point of the neuro-anatomical system. Mental abnormalities are therefore considered to be merely accompaniments of structural anatomical lessions.

Physiological Conception

From the standpoint of physiology, the individual is composed of a complex bio-chemical system and does not merely depend for proper function upon his nervous mechanism but also upon the glandular system, the circulatory system, the digestive and reproductive system, etc. The derangement of any one of these systems may be the direct cause of any mental abnormality and does not necessarily depend upon the proper workings of the nervous system which is merely considered as a secondary involvement. The physiological conception, therefore, tries to explain mental abnormalities in terms of abnormal neutrition, poisoning, infection, blood pressure, decay, atrophy, and glandular imbalance.

The claim that "functional psychoses" is the result of foci of infection of the teeth, tonsils, intestines, etc., aroused considerable interest. Cotton maintains that while functional psychoses may be due to some brain disorders, these conditions are merely secondary to the focal of infection in the body which are the primary cause. He, therefore, advocates that in all the cases of this type, the foci of infection should be attended to first, because the bacteria of the infection are the chief cause of the psychoses. He claims that during the period of ten years before the treatment of the foci of infection was instituted, the average number of patients annually discharged from the hospital, as recovered, was 37%, while the number that recovered after the focal of infection treatment was instituted was 80%. These claims have aroused considerable interest and a controlled experiment was carried out upon a small but carefully selected and observed group of patients, the results of the total group being as follows:

	Control Group (not treated)	Exper. Group (treated)
No. of cases	30	26
No. recovered	5 (16.6%)	4 (15.4%)
No. improved, left hospital	13 (43.3%)	6 (23.1%)
Total benefited	18 (60%)	10 (38.5%)
Total unimprovement	12 (40%)	16 (61.5%)

The results of this experiment disprove to a certain extent Cotton's contention, also weakens in general the contention of the physiological conception advocates.

The Psychological Conception

Here the normal state is first considered which consists in outgrowing various sets of characteristics that are normal to childhood. During

the growing up process it consists of organizing the different tendencies, inhibiting, controlling and selecting them, substituting for them more valuable acquired habits. All this depends upon the technic of learning. Some individuals may fail to outgrow one or more sets of traits, such as failure of inhibitions, control and repressions and substitution of learned attitudes.

Hollingworth[4] in discussing the failure of development in the normal adult sense, claims that it may be due to any of these causes:

"1. Inordinate, constitutional (inherited) strength of the juvenile traits (emotionality, temper, sex drive); or
2. Inadequate cortical development, which thus renders impossible the adequate, organization of even moderate original tendencies (intellectual weakness); or
3. Environmental defects, faults of training, habit, stress of circumstances, which give an unpropitious turn to the organization. Here would also be included bodily injury, trauma, disease."

The Psychoanalogical View

This system represents our efforts to go beyond descriptive accounts and seeks explanations of a differential casual and dynamic sort. Here we *infer* rather than *observe* influences and processes. The concepts tend to become personified and also to include various conjectured and speculative agents and activities which can not be verified by any method of scientific experimentation.

The main objection to this view point is that the principles and concepts relied upon are unscientific. The unsophisticated may take them to be accounts of something that really happened instead of being merely figures of speech. Ordinary psychology is just as capable of describing these facts and notions as well as psychoanalysis.

Functional Disorders and Their Psychological Causes

In considering functional abnormalities one must differentiate as much as possible between organic and functional disorders. This is not always possible to accomplish in view of the fact that the two in some instances overlap each other. In some organic conditions there may be a definite impairment of structure loss, absence, destruction or injury of parts of the organism, especially of the nervous system which is responsible for the disorder of thought, feeling, or conduct. On the other hand, in functional conditions no structural disorders or injury is present. What we may find is an impaired mode of function, i.e., a faulty operation of the mental mechanism.

A purely organic or pathological condition when once diagnosed as such would have an entirely different prognosis or mode of treatment than a functional. It would require either medical or surgical attention, while if the condition be functional it would call for some procedure of

re-education—psychotherapy, suggestion, promotion of insight, changed occupation and environment.

In discussing the conception of functional disorders, McDougall[5] brings out the following point: "If we regard the human organism as a machine, we must admit that it is one that has to work under environmental conditions which frequently vary and often vary too widely. Hence it requires frequent adjustment or regulation, if it is to avoid functional disorder. And the functional disorders from which it is most liable to suffer, perhaps all its functional disorders, are just of the two kinds which are illustrated by the workings of an automobile; namely, disturbance of the balance of functions, and inappropriate timing of its functions. . . .

But the organism differs profoundly from the machine; firstly, in that the purpose which it expresses and in the service of which its parts operate is in some sense, its own purpose; the purpose is resident in the organism; secondly, the adjustments or regulations which are necessary to enable it to meet the frequent environmental changes of conditions of work are made from within. The organism, insofar as it is a machine and fulfils a purpose, is a self-regulating machine. And functional disorder arises when the environmental changes demand adjustments which exceed the organism's powers of self-regulation or purposive adjustment; it is then we see evidence of disturbance of the balance of functions, or of ill-adjusted timing of its reactions."

Types of Functional Disorders

There are certain types of functional disorders which can not be clearly designated as such and they are classed as "reflex disorders." These have a group of symptoms which are chiefly bodily in character. Babinsky designated these as "physiopathic" because they are to be found midway between functional and organic disorders.

Reflex disorders may be tremors, contractures, trophic or growth disturbances, such as atrophy, inadequate circulation or abnormal temperature. These conditions are taken to be functional or mental disorders because they can not be explained from an anatomical viewpoint.

Differential Signs

In order to enable us to differentiate between organic and functional disorders, it is important to have a classification of symptoms. There are, claims Hollingworth, "general signs which are applicable to a great variety of symptoms and some special signs applicable to some special set of complaints."

1. There is an intermission of symptoms in functional cases while in organic they are constant.
2. Organic conditions are stable and invariable and go through a definite course of development. Functional conditions may show extreme variability in character and in intensity.
3. Functional symptoms are more likely to be found amenable to

the devices of psychotherapy, to suggestion, threats and distractions, but truly organic conditions will not yield to any such agents.

4. Organic symptoms are easily assignable to specifically located lessions. Functional symptoms do not lend themselves to this topographic exactitude.
5. Organic conditions usually obey the laws of physical cause and effect. Functional symptoms do not obey the laws of physical cause and effect and are easily manipulated by trick examinations so that many observers are inclined to take them to be malingering.

There are a number of other signs usually employed during an examination in order to determine whether a paralysis, for instance, is of a functional nature. When movements are made or attempted with a paralyzed member, associated movements are more likely to appear in organic conditions and are absent when the paralysis is of a functional nature.

Functional conditions may all come under the following headings:

1. Conditions caused by or constituting emotional stress.
2. Primary habit residuals.
3. Secondary habit residuals.
4. Reflex disorders.
5. Symptoms rendered vivid by attention.
6. Cherished defence symptoms.
7. Compensatory adjustments.
8. Symptoms resulting from dissociation.
9. Redintegrated reactions.

Conscious, Subconscious and Unconscious

In considering functional abnormalities, one must bear in mind the important part of conscious and subconscious play. Consciousness is a condition of awareness of the reaction to a given stimulus.

The subconscious is a mental process of which the individual is not directly conscious, i.e., the stimulus reaction remains below the threshhold of consciousness.

In considering consciousness, one must bear in mind that there are three aspects to be taken into consideration.

1. The thing of which one is conscious of.
2. The process or act of being conscious.
3. The something which is conscious.

The first may be considered as being the stimulus, the second is the response and the third is the individual who makes the response. The something which is conscious is at times called the "I" or the "Ego."

The individual is considered to be an integration of mental systems or parts and that the pattern of the functioning of this integration is personality. It behaves as something which is considered to be a unit, as a single entity, it does this to the extent that there is a true integration of mental system. If the integration of these systems is lacking, the personality will be lacking to that same extent. The behavior of the individual in this case is spasmodic, inconsistent, wanting in uniformity, modifiability and coordination. Without the integration of the mental aspects of the individual, there can be no personality and the individual simply is collective in unrelated parts, dispositions or systems.

Activity of Mental Life

Sidis[6] rejects the popularly accepted notions of cause and effect and thinks that these should be rejected by all scientists. He maintains that nature presents only sequence of events of phenomena and the only relationship observed between cause and effect is one of invariable sequence. If of two phenomena, one is antecedent and the other is consequent, the consequent is invariably observed to depend in its variations on the antecedent which is claimed to be the cause of the consequent. Strains, resistance, enforcement, power, are all states drawn from experience of our psychic life. The psychic process, like the physical process, claims Sidis, may be regarded as an activity, as a sequence of antecedents and consequents. The physical process is regarded as series of successive physical events; the psychic process may also be considered as a series of successive states consisting of psychic elements, presentative and representative.

The Structure and Function of a Percept

As our conscious states are made up of perception it may be of value to find out about the structure and function of a "percept." Sidis[6] compares the structure of a percept to that of a cell. When we examine a cell closely we find the presence of a central element known to be the nucleus surrounded by cytoplasm with its meshwork, the cytoreticulum. The important part of the cell is the nucleus, which has for its functions assimilation and reproduction. The nuclear and cytoplasmic structure form one organized structure, one living cell. The same is equally true about the percept. Here we find a group of sensory elements which constitute the nucleus and a mass of other sensory elements forming the tissue of the percept. It is the nuclear element which dominates the total mental state, both however form the living tissue of the percept.

Any modification in the structure and function of the nuclear element will bring a change in the cytoplasmic mass of the percept, giving rise to a different percept. The same is equally true, any cytoplasmic change will cause a change in the nucleus which may result in a different percept.

The nuclear sensory element awakened by external excitations gives the cue for the reaction, they form the sensitive organization for the

release of motor energy in definite directions. A definite sensory stimulus is the trigger which releases a definite set of motor reactions. For instance, the visual stimuli awakening definite sensory elements may be regarded as central and nuclear which in turn serve as a trigger to release definite systems of motor reactions.

The central nuclear elements are in the focus of consciousness. They are the first to be met by the glance of the mental eye, and are also the last to be left by it. Consciousness plays with its search light on the nuclear sensory elements. The cue then, if it be only the smallest portion of a percept, form for the organism the most vital, most significant, and most constant part of the percept. The individual is stimulated by the nuclear elements his entire attention is going out in the direction to the object that has excited them.

From a biological standpoint clams Sidis[6] we can well appreciate the importance of the central nuclear elements, the necessity of their standing out in consciousness as more prominent and more intense than the rest of the sensory elements. They are considered to be the most significant part of the percept for they inform us what "that" is they are to present to the object, friend or foe, something to welcome or something to fear and flee from. The more delicately differentiated those safety signals are the more protected is the individual in the struggle for existence. To put it in a different way, the more sensitive the individual becomes to the least difference to the nuclear elements the better adjusted will he be to the conditions of the external environment and the better will be his chance in process of the survival of the fittest.

The Mechanism and Sensitivity of the Mental System

Stimuli of certain minimal intensity will stimulate into activity living tissues. If the stimulus is below that minimum intensity the livng protoplasm does not react. This is true of all cells from the highest to the lowest type. The reaction of the different cells to the stimulus shows the sensitivity of the cell. This sensitivity has its physiological threshold. If the stimulus falls below a certain intensity, it can not call forth any reaction in the cell. The rise and fall of the threshold would mean an increase or decrease of the minimal intensity of the stimulus requisite to bring about cellular reaction. If we vary the conditions of sensitivity such as mechanical thermal, electrical, chemical and nutritional, the physiological threshold can be raised or lowered. This is true of entire psycho-physiological system. *There is a threshold of sensitivity below which the minimal stimulus can not fall,* or else it does not bring about any reaction in the system. We may, therefore, state that the intensity of the stimulus is an indispensable condition of the functioning of the psycho-physiological system.

In order that we should get the proper reaction, not only is it necessary that we have the proper intensity of the stimulus, the quality of the stimulus is of equal importance. Habits, habitual movements,

habitual thought depend altogether upon the qualitative character of the stimulus. The quality of the stimulus is also an important factor in the activity of the psycho-physiological system.

Inhibition

There is a third factor besides the quantity and quality of the stimulus which is an important element in the variation of the threshold and that is inhibition. It is a well known fact that fear, distress, pain, etc., act as so many inhibitions on the peripheral organs and serve to arrest the functioning activity. The psycho-physiological system falls under the same general physiological laws of inhibition. Systems become organized in the course of associative activity into complex groups, into complicated systems, which in order to maintain their functioning equilibrium keep one another in check or under inhibition.

Elaborating on this subject further Sidis states that "Inhibition and rise of threshold may also result in a different way in the process of association. We may possibly lay it down as a law, which plays no small role in the interaction of systems and moments, that in a series of aggregation of various systems or moments, forming a more complex organized whole, due to association and synthesis of the component systems, having various thresholds, the ones having the higher thresholds will raise the thresholds of the moments having a greater sensitivity. This, however, may be counterbalanced by the lowering of the moment threshold by associations with moments of great sensitivity, that is, with low moment thresholds.

"While on the one hand the inhibitions and the consequent rise of threshold go along with the complexity of systemic structure as well as with the increase of associative activity, both in extension and intension, there is at the same time an advantage gained for the system, inasmuch as it really has now more chances to become active, on account of the greater number of systems with which it has become associated. The threshold of the associated system rises, but on the other hand, the chances for activity increase, while the liberation or discharge of energy with the consequent evil effects of extreme fatigue, exhaustion and ill nutrition is checked and guarded against by the inhibitions and the rise of threshold.

"What happens now when a psycho-physiological system becomes dissociated? The inhibitions become removed and the threshold falls. The system is no longer checked by inhibitions or by other systems, and hence, with a lowering of the threshold, becomes sensitive, reacting to any slight, passing stimulus, manifesting or liberating all the energy it possesses until fatigue and complete exhaustion set in. From this vantage ground we can understand the fact of the extraordinary energy which the dissociated subconscious systems manifest, so much so that the unusual energy appears almost supernatural, and has on that account been ascribed by the superstitious to diabolical possession. . . .

"Physiologically, it may be said that a neuron aggregate, entering into association with other aggregates and being called into activity from as many different directions as there are aggregates in the associated cluster, has its neuron energy kept within the limits of the physiological level. A dissociated neuron aggregate, on the contrary, is not affected by the activity of other aggregates; it is rarely called upon to function and stores up a great amount of neuron energy. When now an appropriate stimulus liberates the accustomed energy, the activity is overwhelming and is very much like the eruption of an underground volcano, giving rise to temporary attacks, to 'seizures' by subconscious states of the whole field of the upper consciousness. . . . With the restoration of the equilibrium of the neuron aggregate, with the synthesis of the associated system, a synthesis which can be brought about by different methods, the subconscious eruptions, the attacks, or 'seizures' vanish, never to return."

The Principle of Reserve Energy

In the year 1907, Sidis advanced the "principle of reserve energy." He pointed out the importance the inhibitions play in keeping back the neurons from being fully discharged under normal conditions of life, and if these inhibitions are removed it results in the complete discharge of the accumulated neuron energy. This is a very important factor which must not be overlooked in the study of normal and abnormal psychology. It is this accumulated neuron energy through the processes of inhibition which cause a reserve energy to exist and form the basis for the principle of reserve energy. The high thresholds and inhibitions will prevent hasty and harmful reactions as well as useless waste of energy, unnecessary fatigue and exhaustion.

The more we become educated and civilized the more do we develop the process of economy of psycho-neural force, and the saving of mental energy.

In treating cases of psycho-physiological dissociation or cases of nervous exhaustion, one will be greatly assisted if he will keep in mind the biological principle of reserve energy and attempt to use it. In many cases, the inhibitions become too heavy and the threshold too high. In such cases, claims Sidis[6], we must loosen the grip of some of the inhibitions and lower the thresholds those utilizing a fresh supply of dormant reserve energy.

The potential reserve energy is usually brought into action in unusual times and conditions, such as wars and revolutions which bring to the foreground heroes and leaders in some cases men who have never been heard of before.

"Reserve Energy," according to Sidis, "becomes manifested under the influence of radical changes in the environment, just as we have found that psycho-physiological systems react and start into function under the influence of special conditions and special appropriate qualitative

stimuli. In the study of functional nervous and mental disorders, in the study of neurasthenia, or psychasthenia, hysteria, and insistent or recurrent mental states, one becomes more and more impressed with the fact that beyond the psycho-physiological limits of energy available for the habitual adjustments to the ordinary external conditions of life, there is a vast store of reserve energy whose depths one cannot gauge."

Often times we find some cases with ocular muscular abnormalities when they are treated for some time their symptoms complained of before disappear, yet from a clinical standpoint we find little quantitive change in the muscular condition to account for the improvement. The only basis on which some of these cases can be explained is on the principles of reserve energy. Take for instance, the case of Mrs. E. age 36, called for an ocular examination; she complained of frontal temporal and occipital headaches. She was getting periodic dizzy spells and at times would collapse as a result of these spells. Was very nervous and irritable. She was under medical care for some time without any relief. An ocular examination revealed a small amount of hyperopia in both eyes. 4△ exophoria at distance and 10△ at near. Very low adduction 8/4 also a low positive reserve fusion convergence. After treating this case for two months, the patient claimed to note some improvement and at the end of five months she was relieved of all of her symptoms complained of at first. The adduction at the time measured only 16△ and could not be raised any higher. Positive reserve fusion convergence measured only 14△. Quantitatively there was very little change in her muscular condition, but the change must have been mostly qualitative because the patient at the end of the treatment period was completely relieved from all of her former ocular troubles. The only explanation that could be given in this case is that during the period of her muscular treatment a new source of reserve energy must have been tapped which accounts for the improvement in her case.

Types of Mental Abnormalities

With the complexity of modern life and environment, we have to have different modes of reaction to different situations if we are to be adjustive to our activity. When the individual tends to be non-adjustive to specific situations we have a condition of mental disturbance. The non-adjustive condition may be due to only one or several situations. Most abnormal individuals react non-adjustively to more than one difficulty.

Functional Disorders

Functional disorders may be generally divided into two main classifications:

1. Psychoses
2. Psychoneuroses

Psychoses usually denotes a condition of insanity, these are usually institutional cases and very few of them are to be found calling at the

office of the private practitioners. Psychoneuroses cases comprise a large class of mental maladjustments and are to be found mostly outside the hospitals and in all walks of life.

The symptoms which characterize mental patients have been grouped into *symptom-complexes* or *mental syndroms* or it is sometimes referred to *non-adjustive reaction picture*. In practice, the non-adjustive reaction pictures are found to be rather mixed and not pure types. Besides the conditions of phychoses and psychoneuroses, we find other abnormalities amongst patients with abnormal mental states. In discussing these abnormalities, some authorities differ as to their meaning and classification. There seems to be some misunderstanding ambiguity and overlapping of terms used in discussing this subject. Conklin[7] attempts to clarify this confusion and defines some of the conditions as follows:

DEMENTIA is a general enfeeblement of all mental life. This is to be taken that the patient was normal formerly and that this condition is a subsequent development.

AMENTIA is a condition of congenital feeble-mindedness.

There are two types of dementia:

1. Primary
2. Secondary

Primary dementia is a form of mental disease which is characterized from the outset as dementia.

Secondary is sequel to acute mental disturbances.

Psychosis—is an abnormal mental process. This term is used by some authorities to designate conditions in which there are no accompanying anatomical disturbances.

Neurosis—is an abnormal mental process which is the result of an abnormal nervous functioning. Neurosis is now placed in the same group with psychoneurosis. These are often called "functional disturbances" and are the result of forgotten experiences which have prevented the normal course of behavior.

Psychasthenia—may be considered as a phobia, or morbid fear.

Obsessions and compulsions are forms of behavior closely allied psychologically to the phobias, and it is really difficult to differentiate between the two for they so closely resemble each other. These abnormalities may appear in the forms of imagery in the peripheral field. Some people have a *touch* obsession and are not happy unless they touch everything and are very uncomfortable if they try to inhibit the impulse. Others again have a *counting* obsession while some have an obsession for *completeness*. Everything started by themselves or their associates must be completed in every detail or else they are miserable. Many chronic worries have these types of obsessions. They know it is absurd to continue to worry but they cannot help it, and the presence of the idea of danger stirs the emotional reaction. He also calls attention to certain

motor disturbances which involve a small group of muscles. The amount of movement is rather limited in extent: twitching of the shoulders, the arms, the hands and certain facial muscles. These are known as *Tics*. This phenomenon is to be distinguished from hysteria in this respect, that they take place with an accompanying consciousness.

Janet points out "that people who suffer obsessions, phobias, and these mild motor agitations, differ from normal minds in other ways than in the mere fact of disturbance by phobias, obsessions and motor agitations." In these cases the subject's attention processes are not functioning properly, otherwise they would normally eliminate the distracting and irrelevant thoughts.

In trying to account for these abnormalities Janet advances a theory through which he explains these as fundamentally a change in psychological tension. A fear tendency, a disagreeable train of thought, or an impulse to some obvious silly act, all appear as difficult situations to persons of low psychological tension.

Neurasthenia—means a nervous weakness. The outstanding feature of it is fatiguability. Sometimes the exertion of slightest degree of effort or even merely the thought of exerting effort causes fatigue. Reactions are nervous and quick. There may be insomnia, headache, indigestion and other symptoms. White points out that it is often not so much overwork as underwork that produces neurasthenia because he claims that prolonged idleness focuses the attention upon oneself and he becomes conscious of every little sensation of fatigue or strain until finally the sufferer acquires a fixed idea, an obsession that he or she is too "delicate" and incapable of exerting effort. Neurasthenia then is properly described as a functional disturbance by Coriat, who says that exhaustion the physiological condition of fatigue may produce the fatigue sensations and the familiar disinclination to attempt any further work. These cases as a rule are not relieved by rest, but are rather chronically tired.

Anxiety neuroses are conditions of nervous irritability associated with vague general anxious expectations or apprehensions.

Neurasthenia and Neurosis. While neurosis and neurasthenia are classified by some authorities as two separate conditions, Fischer[3] claims that they are really the same thing. There are more cases of neurasthenia in existence than all other types of mental disorders. It is claimed that eight to ten per cent of the population is neurasthenic—some are only occasionally while others are permanently neurasthenic.

Symptom

1. Feeling of extreme fatigue, nervous exhaustion. The neurosthenic fatigue is different than the ordinary type of fatigue, it is reported to be actually greater in the morning than at night. It is not relieved by rest, is fairly constant during the time the individual is awake. This fatigue is very much exaggerated and more intense than in the normal

person. This kind of fatigue is usually not of peripheral origin and is not due to any toxic condition in the muscles or nerves.

2. Headache associated with eye strain, blurred vision and photophobia. These headaches, like the fatigue, are rather constant or rather occur at frequent periods and become very intense. Patients also complain of aches and pains all over the body, especially in the back. He also has digestive disturbances, loss of appetite and also has insomnia of different degrees. There is also in some cases a ringing and buzzing in the ears, head noises and an extreme degree of sensitiveness to stimulation especially to light, glare or noise. We may also find among the neurosthenic conditions of irritability, depression, pessimism, and hypochondria (a morbid concern about one's health).

Some neurasthenics develop a condition of anxiety. This may not be attached to any definite aspect.

The neurasthenic is usually the introverted type of personality and develops an inferiority complex.

Neurasthenia is of a psychological rather than of a physical origin. There is usually an exciting cause and secondary cause. A neurasthenic believes himself and wants others to believe that he is the greatest sufferer in the world. This puts him in some position of distinction and this also furnishes him with an excuse for not assuming a competitive part in life. Neurasthenia may be characterized as persistent non-adjustive compensatory reactions to difficulties.

Psychasthenia is a form of Fobia, obsession scruples, feelings of unreality, depersonalization and inadequacy.

Psychasthenic phobias may all come under two heads:

1. Compulsions
2. Obsessions

Phobia is morbid fear and is very much different from ordinary fear in several respects. It is more intense and paralyzing in its effect. The individual has no control over it.

Obsession is a mental activity of persistent and specific nature which the individual recognizes to be irrational but over which he has little or no control.

Compulsions—are motor activities of a persistent and fairly specific nature which the individual recognizes to be irrational and incongruous with the situation that arouses them but over which he has little or no control.

Motor Agitations may involve any muscles of the body, but they usually involve the muscle of the face, eyes, neck and mouth. This condition is known as psychesthenic tic, it is a form of persistent contraction or twitching of some muscle or muscle group. The individual has no control over it and it is very depressing.

Psychasthenia and *Neurastenia*—contrasted.

Psychasthenia has purely mental symptoms.

Neurasthenia has purely physical symptoms.

Psychesthenia—the symptoms are compulsive. Patient thinks he is compelled to react this way.

Neurasthenic—may be unable to help his fatigue, but it does seem to him that he must react in a certain way that he must be tired.

Psychasthenia—here we are dealing with conflict, a greater degree of repression and dissociation.

Neurasthenia—we are dealing with a continuous state of conflict and a considerable degree of repression.

Hysteria—Janet[8] was one of the first few men to make a thorough study of this subject. He claims that many of the mental cases called formerly by different names are only forms of hysteria.

The psychology of an hysteric patient is sure and simple and it is easier to understand. This problem lends itself more readily to investigation than other forms of mental disturbances. The hysterical patients are easily managed: they talk willingly; they are not dangerous; they can be experimented with without any great fear; they like to be observed and readily lend themselves to the examinations. It is to the reasons mentioned here that made it possible to make more rapid progress in the study of hysteria than some of the other forms of mental disorders.

Conditions of hysteria are to be found in patients belonging to every class of society, and it is not limited to any one nation. It is to be found amongst all nations. The fact that in some countries fewer hysterics were found than in others can be accounted for by the lack of knowledge about this subject by the physicians of that country. It is this lack of the knowledge of this subject that causes so many physicians to make so many mistaken diagnosis and consequently apply the wrong kind of treatment. Many surgical operations have been performed and parts of the body needlessly removed because hysterical conditions have been diagnosed as something else. Janet reports a case where an eye had been enucliated and the optic nerve cut out because of neuropathic pains.

The history of the study and research in hysteria is divided in three divisions. The first was anecdotical and descriptive. It was a period of curiosity and uncritical admiration. A period of witches, convultionists, resurrections of lethargic people, miraculous wounds, etc.

The second period which started in the nineteenth century is called the clinical period. It was for the first time that an attempt was made to give proper attention to this functional abnormality and to recognize phenomena underlying this malady.

The third period may be known as the psychological period. An attempt was made during this period to explain these abnormalities from the standpoint of mental phenomena.

Charcot of France is to be credited as being the first to approach the study of hysterics from a scientific viewpoint. He said "that nothing

is left to chance, on the contrary all happens according to rules, always the same, common to private and hospital practice, applicable to all countries, to all times, to all races." As a clinician he looked for the general laws underlying hysteria in the physiological domain. M. Bernheim and the followers of his school have shown that hysteria with all of its symptoms can best be explained through the domain of moral phenomena. This contest between the two schools led to the development of psychological pathology.

To some observers the conditions of hysteria appeared to be rather simple. They claim that "hysteria is a psychic disease; it is a disease of suggestion; it consists in the disturbances which the patients persuade themselves that they have; it is a disease of persuasion." There is much truth to this definition in view of the fact that it brings forward the psychic character of this condition, but this in itself is not sufficient claims Janet. He maintains that a search should be made in order to determine the laws of hysteria and their application and relation to psychological facts. More preciseness should be used in describing and studying of hysteria.

In his series of lectures Janet explained the numerous abnormalities which may be attributed to conditions of hysteria. One of his lectures he devoted to the subject "The Troubles of Vision." Hysteria he claims has an analytic power. It decomposes the enormous psycho-physiological system, it separates its functions. This is particularly true in the case of vision, because of the fact that vision is a very complicated function, which is subdivided into numerous operations and which plays a great part in the mind. Hysteria may cause a number of dissociations. (1) It may separate the entire visual function from the ensemble of the mind. The result is "hysterical amblyopia." This is a radical and rare dissociation. (2) It may cause the visual function to crumble, dividing and subdividing it into its elementary functions, doing away with one and separating another.

This subject of hysterical blindness had been studied by many authorities such as Landolt, Verel and Parinand. This condition of total blindness comes on usually in consequence of accidents, and it belongs to the phenomena of traumatic hysteria. Janet cites rather an unusual case to illustrate the point. A woman of 27 while reading sees a red flash of lightning which illuminates the room. She shuts her eyes, when she opens them again she can see no more. Once this condition lasted for twelve days, another seven, and another eight. Her sight comes back suddenly just as it disappears. Janet claims that some time it is possible to succeed in making the contradictory character evident and in showing that, in reality, the hysterical, though she maintains the contrary.

Another form of visual decomposition is unilateral amaurosis (blindness in one eye). There is no organic disturbance to account for this blindness. The eye is not injured inwardly or outwardly, with the exception that there may be recognized a suppression of the reflexes of

peripheral origin. This condition sometimes taxes the ability of the examiner to determine whether it is real or whether the subject is malingering.

Hysterical persons at times do not have binocular vision and they are not aware of it, and it may only be revealed by an examination. An hysteric cannot perceive relief by looking through a stereoscope. He also may have the vision of one eye while he is performing the act of binocular vision, or the contraction of the visual and color fields. The form field particularly contracts in circular pattern of 30° or 20°, sometimes it is even as small as 10° or 5° and there is only left central tubular vision. The hysterical patient with such contracted field is able to get around comfortably and is not hindered in any way. This is in contrast with patients whose field contraction of a similar degree is due to some other cause, who are handicapped and are unable to find their way on the street.

Hemeonopsia (vision of only half field), is another condition which may be found among the hysterical persons.

Dyschromotopsia (color blindness), is also found in hysterical persons; the blindness may be for all colors or only for some of them. Violet, blue and green seem to be lost first, while red seems to be the most persistent color.

Muscular spasms, abnormality of ocular movements, and accommodative functions, monocular diplopia, polyopia, and other disturbances of the visual functions may be found amongst hysterical patients.

Treatment of Mental Disorders

In order to treat mental disorders successfully it is important for us to find out first what is causing these disorders. For instance, if they are caused by visceral disorders or other organic lesions then the proper method of approach is to have a physician treat first the organic disorders. These once cured, the mental disorders, may or may not disappear of themselves. To discover the cause of a mental disorder is oftentimes very difficult in view of the fact that it is still a controversial question to date as to whether organic lesions are the cause of mental disturbances or whether the mental disturbances are the cause of the organic pathology.

Rest Treatment

The conditions sometimes responsible for the development of the mental disorders, often are excessive work or effort, either physical or intellectual. While some mental disorders may be caused by emotion instead of excessive work, recent studies revealed that in emotions there is also an excessive expenditure of force which in turn produces a condition of fatigue. Now, if fatigue is the underlying cause of the disturbance then the *rest* therapy should be applied. Weir Mitchell was the first to advocate and put into practice this form of therapy during the last part of

the nineteenth century. This rest treatment is really not purely psychotherapeutic—it is rather of the border line type having a very close relation to the physiologic and psychologic types of treatment.

Types of Treatments

When we study the subject of abnormal psychology and the different types of therapies employed, we may, upon close inspection, conclude that they are all based upon one or the other of three basic principles—they are:

1. Suggestion.
2. Persuasion.
3. Analysis.

Babinsky used suggestion exclusively. Dubois advocated persuasion and Freud employed analysis. No one school makes use of a single principle only, there is a considerable overlapping in each case.

What Is Suggestion?

Suggestion had been used in many instances successfully, yet when those who applied this form of therapy are asked for a definition of the subject or an explanation of the mechanism of suggestion, one will probably receive as many answers as the number of practitioners applying it. McDougall[9] and Janet[10] probably give the clearest definition of this subject. The former claims that "suggestion is a process of communication resulting in the acceptance with conviction of the communicated proposition in the absence of logically adequate grounds for its acceptance" and the latter defines it as "a particular reaction to certain perception; this reaction consists in the more or less complete activation of the tendency that has been evoked without this activation being completed collaboration with the whole personality."

Prof. Chas. Baudouin[11] of France, we believe, gives the clearest of all definitions which is more from a practical than an academic viewpoint. He states that "suggestion is an idea proposed or imposed by the operator, is accepted by the mind of the subject. This idea undergoes transformation into an action so that the object of the idea is realized."

He gives the following four laws of suggestion:[11]

"1. Law of Concentrated Attention—the idea which tends to realize itself in a spontaneous manner is always an idea upon which spontaneous attention is concentrated.

"2. Law of Auxiliary Emotion. When for one reason or another an idea is enveloped in a powerful emotion, there is more likelihood it will be suggestively realized.

"3. Law of Reversed Effort. When an idea imposes itself on the mind to such an extent as to give rise to a suggestion all the conscious efforts which the subject makes in order to counteract this suggestion are not merely without the desired effect, but they actually run counter to the subject's conscious wishes and tend to intensify the suggestion.

"4. Law of Subconscious Teleology. When the end has been suggested, the subconscious finds means for its realization."

Hart[12] discusses this subject fully and concludes that "the therapeutic aim of suggestion is to implant in the mind of the patient a certain conviction and this conviction generally consists in the firm belief that a symptom has disappeared or is about to disappear."

Persuasion

Some investigators claim that suggestion and persuasion are identical but upon close analysis it may be found that this is far from being a fact, because in the case of suggestion the operator implants an idea in the patient's mind and without any rationalization the patient aims to make that idea a fact, while in the case of persuasion the effects are produced by chains of logical reasoning. While there is a distinct difference between suggestion and persuasion, yet the aim of their application may be the same, claims Hart[12] because he maintains that "many of the symptoms of the psychoneuroses are the results of beliefs held with conviction by the patient and that however intricate the chain of causation may be the penultimate link is the conviction that certain symptoms are present. Now, the aim of persuasion, just as the aim of suggestion, is to implant in the mind of the patient the opposite conviction, namely, that the symptoms have disappeared or are about to disappear. Dubois substantiates this claim when he says that "the nervous patient is on the path of recovery as soon as he has the conviction that he is going to be cured; he is cured on the day that he believes himself cured."

Considering the basic difference between suggestion and persuasion, it would seem to me that it is of great importance for the operator to be able to analyze the patient from a psychological standpoint in order to determine whether one or the other method should be used.

Suggestive Individuals.

In order that suggestion should produce the desired results, it is necessary that the subject should possess a disposition to perform the action suggested which is called a tendency.

A tendency, as defined by Janet, is a disposition of the organism to produce a series of particular movements in a definite order in consequence of a certain stimulation at a point in the periphery of the body. They play an important part in the interpretation of psychic phenomena. Some tendencies are innate while others are acquired.

Method of Analysis

In using the analytical method as a therapeutic measure, the assumption is made that some disorders are the results of a chain of mental causes. This being the case, it would seem proper to try to rearrange these causes so that their original effect is no longer produced.

In discussing the different types of therapy, Janet stresses the importance of these two types of treatments:

1. Mental economy.
2. Psychic income.

When we consider some forms of mental therapy, we must not overlook that the law of conservation of energy plays an important part especially in exhaustion type of cases.

In cases of this type the first point of importance is to find out exactly what are the acts that cause this fatigue and exhaustion. This once established we must make out a mental budget and watch the psychic receipts, disbursements, and their balance. This is not a very easy task, to be sure, in view of the fact that we do not always know the amount of energy one must expend to accomplish a certain act. This problem of phychic outlay, of the cost of activity, is one which deserves our study and attention.

Fear of Action

There are certain cases where the patient is afraid to undertake certain tasks because of the fear that they will produce exhaustion. If that be the case then it is our duty to try to change these tasks as much as possible so that they will not require such great outlay of energy, thereby reducing the fear of the contemplated task. Some times it is necessary to give up the attempt of doing certain types of work and have the patient at complete rest in order to build up some reserve energy which is so important in the mental economy.

In the treatment of neuropathic patients, it is important that their lives should be very regular and devoid of excitement. It is a matter of simplification, the reduction of the act and of the outlay.

Our main objective in considering the type of therapy to employ should be twofold:

(1) To reduce all efforts and expenditures of energy as much as possible and practical. This is the form of "mental economy."

(2) To increase psychic income. In order to increase the psychic income we have three methods of approaching this problem. (a) acquiring of tendencies; (b) increasing the quantity of psychic forces; (c) increasing the tension of the psychic forces.

Summary and Conclusions

Considerable progress had been made during the last few years in the study of abnormal psychology and its clinical application. There have been and still are different schools advancing divergent views upon this most intricate and fascinating subject; as a result of this in studying the literature one finds considerable confusion. There is very little uniformity in the nomenclature. One writer may use a term to designate one thing, the other may use the same term to describe an entirely different condition.

The question as to whether abnormal mental states are the results of pathology or whether pathological conditions are produced by abnormal mental states is still not definitely settled. Conklin made a definite contribution in his attempts to define and classify some of the abnormal conditions. Hollingworth gives a clear picture of the normal and abnormal individual. Sidis makes an attempt to explain the activity and mental life, draws a picture of the percept and compares its structure and function with a living cell. He also advances the theory of the "reserve energy principle."

Janet tries to approach the problem from a somewhat different angle. He makes his approach from a clinical standpoint. In his book, psycho-therapy, he attempts to advance a system of diagnosis and proposes certain methods of treatment for specific types of cases. This he does well. He analyzes the different types of conditions minutely, tries to get at the possible cause, and aims to suggest a rational form of therapy.

Most of our information on this subject is speculative, or rather there seems to be a lack of definite knowledge about many of the mental abnormalities. Their ethiology is obscure, the diagnosis uncertain, and the therapy applied may therefore not be of the right type in some instances. There is still much work to be done in this field, but this is equally true of any branch of biology.

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DR. J. I. KURTZ,
1501-1504 FOSHAY TOWER,
MINNEAPOLIS, MINN.

AN ILLUMINATING UNIT FOR ORTHOPTIC TRAINING WITH A PHOROMETER*

John E. Asarkoff, O.D.
and
Meyer Shnitzler, B.S.
Boston, Mass.

An accessory illuminating unit for a phorometer to be used both for the treatment of amblyopia ex anopsia and strabismus can be very readily and inexpensively constructed.

This unit happened to be made for use with an American Optical phorometer, but we do not see why it cannot readily be adapted for any type of phorometer.

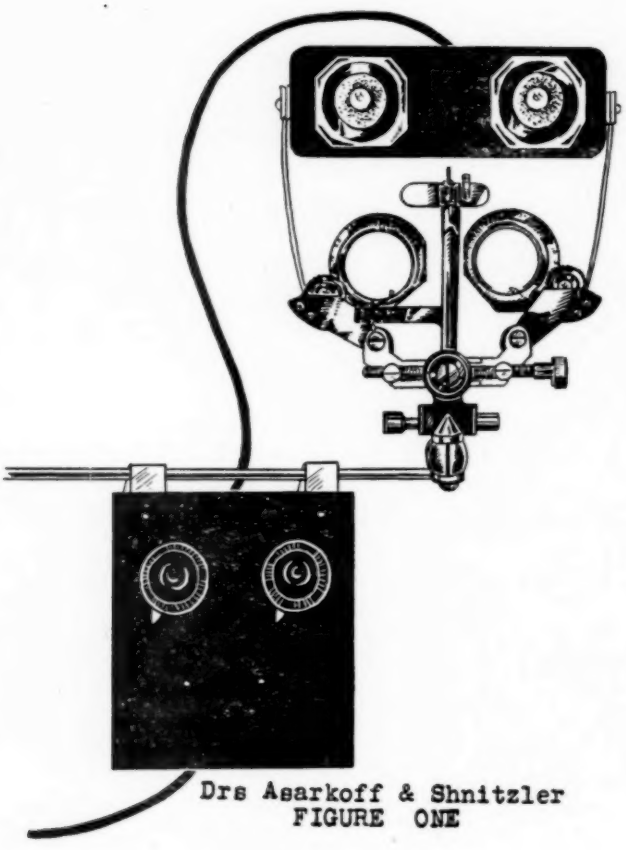
The apparatus illustrated in Figure 1, consists of two parts, the control unit and the illuminating unit. The control unit is comprised of a 6 by 8 inch panel upon which are mounted two 100 ohm rheostats and a 6 volt bell transformer. This section is suspended from the phorometer arm by two nickel plated brass strips. The connections from the rheostats are made to the other, or illuminating unit.

This unit is constructed by mounting two flashlight heads about 3 inches apart upon a panel which is 6 inches long and 3 inches wide. This illuminating panel is supported above the phorometer head by two nickel plated brass strips which are clamped below the lens holders. The brass strips are attached to the panel by single screws, which allows the panel to be tilted to any desired angle.

The electrical connections are made as shown in the accompanying diagram, figure 2.

The card holder is placed on the phorometer in the usual manner and the desired training card inserted. The control unit is suspended from the phorometer arm and the illuminating unit is clamped on to the phorometer head. The panel is adjusted so that when the current is turned on the light will fully illuminate the card in the holder. A septum, which can easily be made of cardboard, is placed in line with the septum of the phorometer so that the card in the holder is divided into two parts. This second septum is used in order to allow us to illuminate only one side of the card at a time if we so desire.

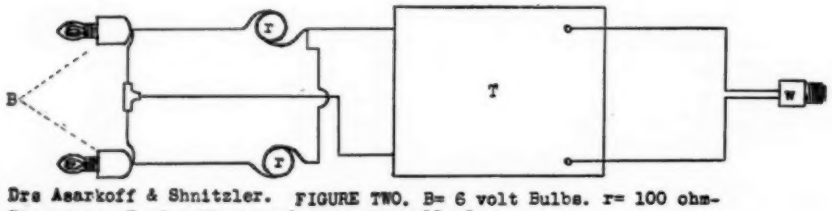
*Submitted for publication September 30, 1935



Drs Asarkoff & Shnitzler
FIGURE ONE

If the vision is equal in both eyes and we desire to give the patient orthoptic training, the accessory septum is not necessary and we simply turn both rheostats on fully, thereby brightly illuminating the card.

However, if amblyopia ex anopsia is present and we desire to institute orthoptic training or to treat the amblyopia, we simply insert the cardboard septum and turn the rheostat controlling the light over



Drs Asarkoff & Shnitzler. FIGURE TWO. B= 6 volt Bulbs. r= 100 ohm-Rheostats. T= 6 volt transformer. w= wall-plug.

the amblyopic eye on fully and dim the light over the other eye by turning the second rheostat. The intensity of illumination on both sides of the card can be controlled by turning the corresponding rheostat on or off.

For those who desire to treat amblyopia by means of a flashing light, this can easily be accomplished by inserting a flasher into the wall plug and connecting the wire from the transformer to the flasher.

DRS. J. E. ASARKOFF & M. SHNITZLER
44 BROMFIELD ST.
BOSTON, MASS.

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EDITORS

DR. CAREL C. KOCH
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

DR. JACK I. KURTZ
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

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CONTINUING AN OPTOMETRIC PRACTICE

Optometrists as a whole continue individualistic in their professional activities, whereas much of the rest of the world has made marked strides in organizing along cooperative lines. As long as the optometrist practices as a professional individual, he is subject to an evaporation of marked loss of intangible assets as soon as age or incapacity makes it impossible for him to continue actively at his office.

Manufacturers and other business men, on the other hand, construct as a rule an organization which, through an expression of their own effort and personality, is an entity apart, which outlives them, especially if it is incorporated. In this manner consequences of the original energy and foresight of the pioneer continue on for the benefit of his heirs and assigns. And in addition to this, after retirement, the founder is able to draw a substantial share of continued earnings of the business if he retains his holdings or equity. If he decides to withdraw, he can amass capital by selling out to another, his intangible assets—good will, earning power, going concern value, and prestige. The professional optometrist is not in a position to do this. The edifice which he has erected to a large degree collapses as soon as he leaves his field of operation.

Accordingly, optometrists as a group have been natural investors, compensating themselves in their portfolio of stocks and bonds, real estate and insurance, for the lack of a permanent equity, independent of their own continuing service, in their own professional activity. Must this state of affairs continue? Must optometrists forever fritter away their intangible assets? These are not academic questions, raised by an outsider. They are practical issues which I as an optometrist am myself grappling with.

I also have before me a letter from a thoughtful optometrist in the midwest who writes: "I am writing to find out if you can help us in solving a financial problem in connection with our partnership. We are two partners, both of us right around fifty-five years old. We would like to know if you could suggest some plan by which we could still retain an interest in the income of our practice after we have partly retired from actual practice.

"We have a good practice, which has been worked up during the last twenty-two years. We are both optometrists. We have two well equipped refracting rooms, a treatment room, also physiotherapy and a mechanical optical laboratory. We feel that there is something here which, when turned over to our successors, will be of great value to younger optometrists who are qualified to step in and continue the work, whether you call it 'good will' or the same thing by another name. The thing we are now discussing is just how we could dispose of our optometric practice without being obliged to terminate our income abruptly.

"Any suggestions you may be pleased to offer us in this connection will be appreciated."

Now, if this were an ordinary business proposition, a plan of organization would be simple. But this matter is complicated by professional tradition, ethics and inhibitions. Apart from the personal interests of the two optometrists, there is a community aspect to this problem. Presumably, the people of their city have found from experience that this optometric group is trustworthy and competent. It has come to represent a standard of ocular service and of professional skill. If in a decade, these men should retire and give up their optometric office, their patients will be turned free, with no guidance as to their future ocular professional contacts. These patients, I believe, would be better served if the office were then continued, with younger optometrists in active practice and these older men in the background in an advisory capacity thereby signifying by their continuing interest that they certify to the competence and dependability of their new optometric associates. To use an advertising analogy, the older optometrists would be lending their trade mark, so to speak, to their new associates, and in doing so, they would recognize the needed moral responsibility of selecting only worthy optometric associates for such moral sponsorship.

If suitable optometric associates could be found among home boys, it would be advisable. But in order to assure the utmost competence, the older optometrists ought to enlarge their fields of choice. They should communicate with the deans of optometric colleges, asking them to recommend recent graduates who seemed to be most fitted for the type of professional activity in mind. When selected the newcomers could first start as assistants to the older men, with the understanding that if they showed sufficient ability, they would gradually be allowed to take over the responsibility of active practice. During the period of probation the young optometrists could participate in the aggregate earnings of the group. If a ten year program were worked out, the junior practitioners could be assured a rising ratio of participation in group earnings, increasing their share each year. Until the senior optometrists had an opportunity to observe the younger men in actual practice for several years, they ought to reserve the right to discontinue the arrangement on short notice. Then, after a substantial trial period, those junior optometrists retained could enter into a permanent contract, under which they would receive an annual step-up in the proportionate income of the group and the senior optometrists conversely would receive a gradual declining ratio. At the age of sixty-five the older men would retire from active practice, but remain in an advisory capacity, retaining a moderate permanent share in the income either for life or for a stipulated period, such as an additional ten years.

Up to this point I have suggested no definite figures, for they would depend on special circumstances and individual negotiations. However, to make the plan concrete, I shall suggest hypothetical detailed arrangements.

First let us assume that the Optometric Practice shows net annual earnings of $15,000 which are now equally divided between the two partners. During the next ten years, the two senior optometrists would remain in active practice, but would be assisted by two junior optometric assistants. The greater facilities resulting from the increase in personnel and the growth and development of the community might be assumed to result in a ten per cent annual increase in income. Thus the net annual income would be as follows:

1st year	$15,000
2nd year	16,500
3rd year	18,000
4th year	19,500
5th year	21,000
6th year	22,500
7th year	24,000
8th year	25,500
9th year	27,000
10th year	30,000

The two junior optometrists would draw $30.00 weekly in salary during the first year or an aggregate wage charge of $3,120. In the second year, they would receive $40.00 weekly, or an aggregate of $4,160. In the third year, they would receive $50.00 weekly or an aggregate of $5,200. In the succeeding years, they would get a guarantee of a minimum of $50.00 weekly, but would receive the following participations in the earning of the group:

TWO JUNIOR OPTOMETRISTS

Year	Both	Each
4th year	$ 5,880	$2,940.00
5th year	6,750	3,375.00
6th year	7,680	3,840.00
7th year	9,180	4,590.00
8th year	10,800	5,400.00
9th year	12,825	6,412.50
10th year	15,000	7,500.00

For the group, this plan, assuming a ten per cent annual increase in net income would work out as follows:

Annual Income	Compensation to Juniors	Balance
1st year	$ 3,120	$11,880
2nd year	4,160	12,340
3rd year	5,200	12,800
4th year	5,880	13,620
5th year	6,750	14,250
6th year	7,680	14,820
7th year	9,180	14,820
8th year	10,800	14,700
9th year	12,825	14,175
10th year	15,000	15,000

According to these assumptions, the senior optometrists will have over the next decade built up a quasi-permanent organization, without any material sacrifice of their own income. They will average slightly less than their present income for the next ten years, but the slight loss will more than be offset by the development of a continuing organization, in whose income after their semi-retirement in ten years, they will participate. Meantime the optometric juniors, just out of college, will assure themselves excellent training and a satisfactory living wage. The ten year average income of the junior optometrists will be in excess of $4,000 annually.

In the eleventh year, the senior optometrists will retire to an advisory capacity, and there should accordingly be a small recession in the group earnings. This set-back will be minimized by the fact that the two older optometrists will continue to lend their prestige and support, and also by the fact that the two younger men will have by this time doubtless won the confidence and respect of the patients. If we assume

that in the eleventh year the net earnings recede to those of the eighth year or $25,500 the following division could be made.

Income	Share of the Two Active Optometrists	Share of the Two Retired Optometrists
$25,500	70% or $17,850	30% or $7,700

On this basis, each of the retired men would receive $3,850 annually which would be equivalent to the return of an invested capital sum of $77,000. If continued for life, it would be a worthwhile and substantial annuity for both members of the original group.

The figures are, of course, arbitrary, and would vary in every particular case.

They allow little or nothing for the stimulus the practice is bound to receive from the younger men who come in with new ideas and new technics. In practice, these benefits, not only financially but also professionally will be substantial.

These figures also assume that the group would continue along conventional and professional lines. The true economy of the plan lies in the fact that the younger men would avoid the bad social waste of floundering during the first years after their graduation. They would avoid the waste of idle hours during the painful years of developing an optometric practice. They would also avoid the off-time ruinous effect of working for the "price-cutter" while the young graduate saves his money for a start of his own. On the other hand, the older optometrist would avoid loss of these intangible assets in the form of contact with patients by very gradually passing these patients along to the new associate. This entire plan would succeed or fail in accordance with the judgment with which the younger men were selected. Accordingly I have suggested at the outset a three year trial period, during which there could be shifts of personnel as experience warranted. Socially, patients would avoid dangerous experiments in changing from old to younger men. There would be a new continuity to optometric services; the younger optometrists are given a splendid opportunity to practice and the senior members of the profession are assured both splendid help when they most need it as well as an income in the later years of their lives.

C. C. K.

* * * * *

BOOK REVIEW

THE AMBLYOPIC READER by Dr. Margaret Dobson, published by the Rambrant Photogravure Co., Ltd., Drury House, Russell Street, London, England. W.C.2. Price 15 Shillings (about $3.75).

"The Amblyopia Reader" has been designed by Dr. Margaret Dobson and consists of a book printed in red and black with suitable reading matter to interest children. The production of the book is ex-

cellent and leaves no room for criticism and this is not surprising for a considerable amount of money has been spent on it.

When using the book a red screen is placed in front of the good eye so that this eye does not see the words and letters written in red: consequently if the reading matter is properly read, the practitioner knows that the amblyopic eye is participating in vision.

The size of type in the book is where the inventor has shown a complete understanding of what visual acuity means. If the book is held at 33 cm, amblyopia with an acuity below 20/200 can be trained to a vision of 20/20. At 33 cm. J. 16 (reading type), represents a visual acuity of 20/200, so that an amblyopic eye with a vision of this amount will be able to read J. 16 and larger type but will not read smaller type. Training is of course proceeded with until the J. 14 type is readable, and so on until J. ½ is accomplished, when distance acuity will be 20/20.

If such training were undertaken on distance test types, an enormous number of charts would be required and the training would be uninteresting, even if possible. With Dr. Dobson's book there is a great variety of practice matter which will appeal to children, and adults will find it interesting should treatment be required.

An examination of several devices for training amblyopic eyes reveales that the letters or objects used are too large, and that many amblyopic eyes can see them because of the fact that when the objects are viewed at near distances, the visual angle they subsend is of such a size that the amblyopic eye has no difficulty in seeing them. Dr. Dobson's book has removed this difficulty by using type based on Snellen's fraction. The book can be lent or sold to the patient for practice at home, for the method is very simple and in the case of children can be supervised by the parent or nurse. When all is said and done, the treatment of amblyopia is largely a matter of perseverance on the patient's part and treatment at home is essential, for a weekly visit or two is not enough to bring about much improvement.

The author of the book has written an extensive preface which explains amblyopia, and this has been done to instruct the patient or the patient's parents on the subject so that training can be undertaken inelligently, and it is feasible that the book will in time become known sufficiently for it to be asked for by those whose vision is below normal.

The writer is glad to see the use of type corresponding to the correct visual angles. He dealt with the subject in a series of papers on "Accommodation and Convergence" in various journals, and pointed out the fact that a study of this subject showed that our conceptions of accommodation need revising and that the accommodation is a varying quantity according to the visual angle of the type that is read.

L. A. SWANN
SOUTHALL, ENGLAND.

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